

Interactive comment on “Deeply subducted continental fragments: I. Fracturing, dissolution-precipitation and diffusion processes recorded by garnet textures of the central Sesia Zone (Western Italian Alps)” by Francesco Giuntoli et al.

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The manuscript: “Deeply subducted continental fragments: I. Fracturing, dissolution-precipitation and diffusion processes recorded by garnet textures of the central Sesia Zone (Western Italian Alps)” by Giuntoli and coauthors is an interesting paper which deals with an alternative interpretation about the unravelling of a complex polyorogenic multistage history of an eclogite facies metasedimentary rocks from the Western Alps.

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More in particular, a Variscan relic granulite facies paragenesis was replaced by an Alpine eclogite facies metamorphic cycle, which produced characteristics HP garnet overgrowth on previous HT garnet per each stage of the entire high dP/dT clockwise evolution. This process seems to be catalyzed by an initial brittle failure process, interpreted by the author as an early Alpine high strain rate deformational stage which brought to the formation of porphyroclastic texture, preserved in all of the observed garnet cores, as well as by a relatively thin mesh of microfractures sealed by grossular rich garnet. Although the work presents high-quality analytical data, unfortunately, the manuscript does not have a clear focusing line. It seems often a description of samples without sufficient context to allow the reader appropriate information to assess the processes proposed. The problem starts from the sample selection strategy. This is indeed not sufficiently justified to underline the specific peculiar features useful to better highlights the different mechanisms of garnet overgrowing stages developed during the Alpine evolution. It is out of sense for instance, during discussion, uses the name of the sample to describe the specific textural characteristics of the related Alpine garnet overgrowing stages. For an external reader, a name is a name. Instead, should be better associate a name to a specific process. Moreover, during in the introduction as well as in the discussion, were not taken into account any alternative possible interpretation for justifying the observed garnet texture. For instance, some brittle behavior can be generated not only by a high strain rate in non-coaxial regime but also by plastic-to brittle transition with the formation of a fractured mesh that might represent evidence of past episodic tremors or “slow earthquakes” triggered by high pore fluid pressure (Malatesta et al., 2017 Geological Magazine). What other evidence have the authors to justify their interpretation? Finally, in my opinion, the potentiality of the quantitative data extrapolation from image analysis by X-Map tools, was not satisfactory, in term for instance of the extrapolation of the effective reactant volumes of the single observed paragenetic equilibria. This can be useful to better constrain the ab initio parameters useful for a more consistent thermodynamic modeling, which unfortunately, was not described in the manuscript. For all of the above reasons, the

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manuscript requires a deep major revision, consisting in a substantially rewriting of the introduction and of the discussion part, focusing the attention for instance to the use of the image analysis in the calculation of the effective bulk rock chemistries for the single extrapolation of paragenetic equilibria. Moreover, it is fundamental a better presentation of the complete methods utilized, together with a greater contextualization of sample selection. Specific details are reported in the attached pdf. Sincerely, Gaetano Ortolano.

Please also note the supplement to this comment:

<https://www.solid-earth-discuss.net/se-2017-87/se-2017-87-RC2-supplement.pdf>

Interactive comment on Solid Earth Discuss., <https://doi.org/10.5194/se-2017-87>, 2017.